



NDIA
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Interceptor Technology Research Area

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Agenda

- Research Area Objectives
- List of Topics
- Topic Overviews
- Questions



Interceptor Research Area Scope and Objectives

- **Scope:** Develop technologies for spiral upgrades to current Ballistic Missile Defense (BMDS) interceptor systems and enable advanced interceptor concepts
- **Objectives**
 - Close technology gaps in BMD interceptor Elements
 - Intercept various threats in all phases of flight
 - Help discriminate lethal targets from decoys
 - Defeat asymmetric threats



Interceptor Research Area 2007.3 SBIR Solicitation

TOPIC	Topic Team Lead	Co-leads
Interceptor algorithms	Tracy Wentworth	Dimitrios Lianos Noel Paschal Craig Phillips
Advanced Synergistic Structures for Interceptor Kill Vehicles	Gene Fosness	Joe Ratliffe
Advanced Interceptor Guidance, Navigation and Control Components	Dimitrios Lianos	Gary Reisenwitz Noel Paschal Greg Jones
Interceptor seekers	Meimei Tidrow	Dimitrios Lianos Noel Pascal
Adv. Interceptor Axial Propulsion and Miniature Divert & Attitude Control Systems	Pashang Esfandiari	Edward Barth Greg Stottlemeyer
Interceptor Avionics	Doug Engle	Dimitrios Lianos Pashang Esfandiari
Interceptor Radiation Hard Components	Steve Sampson	James Lyke Erwin Myrick



Topic:

Interceptor Algorithms

- **Develop and demonstrate**
 - Advanced Guidance, Navigation and Control algorithms for engaging and intercepting maneuvering targets in all phases of flight
 - Algorithms for multiple kill vehicle weapon-target assignment, collision avoidance, multiple apertures, and formation flying
 - Algorithms for improved interceptor operations in a hostile environment
 - Algorithms supporting kill vehicle participation in discrimination
 - Interceptor signal processing and data processing algorithms
- Performance goals include the minimization of miss distance with minimum interceptor control energy and freedom from reliance on a priori data.



Topic: Advanced Synergistic Structures for Interceptor Kill Vehicles

- **Synergistic structures**
 - Structures with multiple functions (e.g., fuel tanks or batteries that function as load-bearing KV structure and/or protect against hostile environment)
 - Structures with embedded components (electrical, optical, power, propulsion, sub-structures, isolation, etc)
- The synergy must not compromise the integrity of the interceptor and must significantly improve key interceptor performance parameters (speed, volume, mass, accuracy, agility, etc.)
- Structures must be designed to meet the operational environment (temperature variations, high acoustic levels, maneuvering loads, high shock loads, >300krad, and severe vibration loads)



Topic: Advanced Interceptor Guidance, Navigation and Control

- Design, develop, and demonstrate highly integrated, compact, high-performance, lightweight GNC component technologies to include the following:
 - Gyros
 - Accelerometers
 - Associated electronics
 - Integrated units (Inertial Reference Unit, Inertial Measurement Units)
 - Global Positioning System augmentation
- Advanced non-propulsive interceptor control components
- Focus on agile interceptors to defeat various types of targets, mitigate the discrimination problem and defeat asymmetric threats



Topic: Interceptor Seekers and Sensors

- Design, develop and demonstrate highly integrated, compact, lightweight interceptor seeker technologies
 - Seeker components, for RF and EO/IR seekers
 - Advanced active, passive and dual-mode seekers
- These technologies will supported integrated seeker suites to enable advanced, agile interceptors that
 - Counter maneuvering targets
 - Facilitate discrimination
 - Defeat the asymmetric threats
 - Improve current BMD interceptor capabilities
- A primary objective is long range detection, tracking and intercept of all Ballistic Missile Defense (BMD) endo- and exo- atmospheric targets



Topic: Advanced Axial Propulsion and Miniature Divert & Attitude Control Systems

- Develop and demonstrate novel concepts for advanced solid and liquid interceptor propulsion components and systems for endoatmospheric and exoatmospheric use
 - Advanced axial propulsion and DACS as well as possibilities for combined, flexible axial/divert systems
 - Lightweight DACS with high delta velocity (> 700 m/sec) and high thrust (> 5 gs) that enable high system mass fraction ($> 40\%$) are of special interest
 - Advanced propellants and components (thrusters, tanks, valves, etc) for high thrust, high delta V, fast reaction performance
 - Novel propulsion systems for interceptor and KV light weighting and high agility
 - Criteria include low cost, light weight, high performance, fast reaction, and resistance to high temperature and high pressure



Topic: Interceptor Avionics

- Develop and demonstrate innovative, high performance avionics components and systems to enhance interceptor capability with emphasis on operation in a hostile environment
 - Signal processors and data processors
 - Power, power conditioning and novel power systems
 - Enhanced communication components and systems for robust interceptor and KV updating.
- Criteria include low cost, small size, light weight, improved bandwidth, power efficiency longer range reduced sensitivity to shock and vibration



Topic: Interceptor Radiation Hard Components

- **Design and demonstrate**
 - Radiation hard piece parts and components (focal plane arrays, analog-to-digital (A/D), D/A converters, memory, processors, and other avionics) and shielding for HAENS interceptor environments
 - Innovative concepts that use radiation-hardening by process, by design, by architecture or a combination of these approaches that will result in cost effective solutions, including synergetic solutions that integrate radiation hardness and anti-tamper capabilities
 - Radiation hardening test systems, approaches, and methods
- Goal is near-current-commercial product performance for interceptor systems while surviving radiation and transient effects in a hostile environment.



QUESTIONS?